

Mandatory Childhood Vaccination in Croatia: Positive Attitudes and Areas of Uncertainty Among Nursing Students

Nursing Students' Attitudes Toward Mandatory Childhood Vaccination

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ABSTRACT

Introduction: Childhood vaccination is one of the most effective public health measures for preventing and controlling infectious diseases, and nurses play an important role in its implementation and promotion. The study aimed to examine nursing students' attitudes toward mandatory childhood vaccination according to the vaccination schedule of the Republic of Croatia and to determine whether these attitudes differed with regard to sociodemographic variables.

Methods: A cross-sectional study was conducted among 119 undergraduate and graduate nursing students at a higher education institution in the Republic of Croatia. Data were collected using an anonymous questionnaire that assessed attitudes using a Likert scale. Data were analyzed using Microsoft Excel and JASP.

Results: Statistically significant differences in attitudes were found according to age ($P < 0.001$) and employment in the nursing profession ($P = 0.0014$). Participants not employed in nursing had higher at-

titude scores than those employed in nursing. No statistically significant differences were found according to year of study ($P = 0.547$).

Conclusion: The findings indicate the need for additional education and guidance for nursing students during their studies to strengthen positive attitudes toward vaccination. This may enhance their future role in public health interventions and community health protection.

INTRODUCTION

Childhood vaccination is one of the most effective public health measures for preventing and controlling infectious diseases. Vaccines protect children from potentially severe and fatal infections and contribute to herd immunity, thereby reducing disease transmission within the community. Timely vaccination according to the national vaccination schedule is essential for protecting the most vulnerable groups, including newborns, immunocompromised individuals, and older adults [1, 2].

Nurses play an essential role in the implementation of vaccination programs. In addition to participating in the vaccination process itself, they are often the first point of contact for parents and children within the healthcare system. Their role includes informing, counseling, and educating parents about the importance, safety, and effectiveness of vaccines. In the context of increasingly widespread misinformation and distrust of medical recommendations, nurses' expertise, accessibility, and communication skills are particularly important [3]. Their central role in community vaccination programs makes them essential sources of information and education for the public [2]. However, in their daily work, nurses and other healthcare professionals face numerous challenges, including the negative influence of the media on the implementation of public health interventions [4]. Misinformation and conspiracy theories about vaccines are increasingly present in the public sphere, particularly on social media, and significantly affect individuals' attitudes toward vaccination [5]. The rapid spread of inaccurate information, known as an infodemic, can have serious consequences for population health by undermining trust in the healthcare system and evidence-based recommendations [6].

In this context, it is particularly important to foster positive attitudes toward vaccination among nursing students during their education. As future healthcare professionals, they will play an important role in educating patients and parents and promoting vaccination as a key measure for protecting community health. Their attitudes can significantly influence vaccination decision-making, particularly when patients are exposed to conflicting information from different sources.

Educational programs play an important role in shaping students' attitudes by providing them with the knowledge and skills needed to understand the importance of vaccination and its role in disease prevention [7, 8]. In addition, the use of different information sources, including the media and direct communication with experts, can help clarify uncertainties and reduce vaccination-related fears [9]. Raising awareness of responsibility for community health may contribute to the development of positive attitudes and a professional approach to this public health measure [9, 11]. Evidence from multiple countries indicates that vaccination may be delayed

or refused because of doubts about the importance, safety, and effectiveness of vaccines, while barriers to vaccine access also persist [10]. This highlights the need to strengthen vaccination-related education and competencies among healthcare professionals, particularly those still in training. Assessing nursing students' attitudes is therefore essential for improving educational programs and developing strategies aimed at promoting vaccination.

The aim of this study was to examine nursing students' attitudes toward mandatory childhood vaccination according to the vaccination schedule of the Republic of Croatia and to determine whether these attitudes differed with regard to sociodemographic variables.

METHODS

Study design

A cross-sectional study was conducted [12].

Setting and samples

The study included a convenience sample of 119 participants who met the following inclusion criteria: enrollment in a full-time undergraduate nursing program or a full-time or part-time graduate nursing program at a higher education institution in the Republic of Croatia, voluntary consent to participate in the study, and attendance in class on the day the study was conducted.

Measurements/instruments

A survey questionnaire specifically designed for this study was used. The questionnaire consisted of two sections. The first section covered the participants' general characteristics, including age, gender, year of study, type of secondary school completed, employment in the nursing profession, and vaccination status. The second section contained questions assessing their attitudes.

The questionnaire was developed based on relevant literature and guidelines and recommendations on vaccination issued by the Croatian Institute of Public

Health and the World Health Organization [13–17]. A total of 27 items were developed to assess the attitudes of undergraduate and graduate nursing students and were grouped into six thematic domains: (1) attitudes toward the effectiveness and safety of vaccination (7 items), (2) mandatory vaccination and the right to make decisions (6 items), (3) sources of information and the media (5 items), (4) vaccination education (4 items), (5) attitudes toward healthcare professionals (3 items), and (6) personal attitudes toward vaccination (2 items).

Participants rated their level of agreement with each statement on a five-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). To facilitate interpretation of the results, the responses “agree” and “strongly agree” were combined into the category of positive attitudes, while “disagree” and “strongly disagree” were classified as negative attitudes.

Data collection/procedure

Data were collected using a structured paper-and-pencil questionnaire administered to nursing students at a higher education institution.

Ethical considerations

The study was conducted in accordance with applicable ethical and legal guidelines for the protection of participants, including the principles of Good Clinical Practice, the Declaration of Helsinki, the Health Care Act of the Republic of Croatia, and the Act on the Protection of Patients' Rights of the Republic of Croatia. Participant anonymity and confidentiality were strictly maintained throughout data collection and processing.

Before inclusion in the study, participants received written information containing all relevant details, after which they provided informed consent to participate. To further protect their identities, signed

consent forms were stored separately from completed questionnaires, thereby preventing responses from being linked to individual participants. Participants were also provided with an email address they could use to ask questions or seek clarification about the study.

Statistical data analysis

Descriptive statistics included the mean, standard deviation, variance, minimum and maximum values, and frequencies.

Group differences were examined using the parametric analysis of variance (ANOVA) and the non-parametric Kruskal-Wallis and Mann-Whitney U tests. Statistical analyses were performed using Microsoft Excel and JASP version 0.19.3 (Department of Psychological Methods, University of Amsterdam, Amsterdam, the Netherlands), with statistical significance set at $P < 0.05$.

RESULTS

A total of 119 participants took part in the study, of whom 105 (88.24%) were women. Most participants were aged 20–29 years, and the mean age was 26.97 years (range 20–56). A total of 96 (80.67%) participants had completed secondary medical school. The largest group comprised 44 first-year graduate nursing students (36.97%), whereas the smallest group consisted of first-year undergraduate nursing students, 9 (7.56%). Most participants were employed in the nursing profession, 63 (52.94%). All 119 participants (100%) had been vaccinated during childhood according to the mandatory vaccination schedule. Twenty-five participants (21.01%) had children, and all 25 (100%) reported that their children had also been vaccinated according to the mandatory vaccination schedule (Table 1).

Table 1. Sociodemographic Characteristics of Participants (N=119)

Sociodemographic variable	Category	n (%)
Gender	Male	14 (11.76)
	Female	105 (88.24)
Age group (years)	20 – 29	92 (77.32)
	30 – 39	9 (7.56)
	40 – 49	16 (13.44)
	50 – 59	2 (1.68)
Secondary school completed	Secondary medical school	96 (80.67)
	General secondary school	19 (15.97)
	Vocational secondary school	4 (3.36)
Year of study	First year of undergraduate study	9 (7.56)
	Second year of undergraduate study	18 (15.13)
	Third year of undergraduate study	23 (19.33)
	First year of graduate study	44 (36.97)
	Second year of graduate study	25 (21.01)
Employment in the nursing profession	Yes	63 (52.94)
	No	56 (47.06)
Personal vaccination status	Yes	119 (100)
	No	0 (0.0)
Vaccination status of participants' children¹	Yes	25 (100)
	No	0 (0.0)

¹ Calculated among participants who had children (n=25).

Table 2 presents the distribution of positive, neutral, and negative response categories across the six thematic domains. In the domain of attitudes toward the effectiveness and safety of vaccination, most responses (69.63%) were classified in the positive response category (agree or strongly agree). Analysis of individual items showed that 113 (94.96%) participants agreed or strongly agreed that *vaccination provides the best protection for children against infectious diseases*, while 104 (87.40%) agreed or strongly agreed that the benefits of *vaccination outweigh its potential harms*. A neutral response was selected by 34 (28.57%) participants for the item concerning whether vaccines had been *sufficiently researched before administration* and by 39 (32.77%) for the item concerning the *association of vaccination with autoimmune diseases and autism*.

In the thematic domain of mandatory vaccination and the right to make vaccination decisions, 101 (84.87%) participants agreed or strongly agreed that vaccination should be *mandatory for every child in the Republic of Croatia* and were therefore classified in the positive response category. For the item concerning *parental autonomy in vaccination decision-making*, 54 (45.38%) participants were classified

in the negative response category, 26 (21.85%) in the neutral response category, and 39 (32.77%) in the positive response category. For the item concerning *financial penalties as an incentive for childhood vaccination*, 42 (35.29%) participants were classified in the positive response category, 41 (34.45%) in the negative response category, and 36 (30.25%) in the neutral response category. For the item concerning societal pressure on parents, 66 (55.46%) participants agreed or strongly agreed that *society places pressure on parents, making it more difficult for them to make decisions about childhood vaccination*.

In the thematic domain of sources of information and the media, the largest proportion of responses (40.50%) was classified in the negative response category. For the item concerning *social media as a source of information for parents*, 102 (85.71%) participants agreed or strongly agreed. A total of 104 (87.39%) participants agreed or strongly agreed that the *Internet is an unreliable source of information*, while 65 (54.62%) agreed or strongly agreed that *social media facilitate the spread of the anti-vaccination movement*.

In the thematic domain of vaccination education, the largest proportion of responses (38.24%) was

classified in the negative response category. For the item concerning *parents' lack of knowledge as the main reason for vaccination refusal*, 102 (85.71%) participants agreed or strongly agreed. For the item concerning the *adequacy of education provided by healthcare professionals*, 60 (50.42%) participants were classified in the negative response category, while 44 (36.97%) selected a neutral response. For the item concerning the *sufficiency of vaccination-related information acquired during their education*, 54 (45.38%) participants were classified in the positive response category, 34 (28.57%) in the neutral response category, and 31 (26.05%) in the negative response category.

The thematic domain of attitudes toward healthcare professionals comprised three items, with 57.14% of responses classified in the positive response category

and 30.53% in the neutral response category. For the item concerning *healthcare professionals' activities in promoting childhood vaccination*, 49 (41.18%) participants were classified in the positive response category, while 46 (38.66%) selected a neutral response. For the item concerning *healthcare professionals' positive attitudes toward vaccination*, 68 (57.14%) participants agreed or strongly agreed, while 41 (34.45%) selected a neutral response.

In the thematic domain of personal attitudes toward vaccination, 91.17% of responses were classified in the positive response category. A total of 110 (92.44%) participants reported that they would *vaccinate their own child according to the vaccination schedule of the Republic of Croatia*, while 107 (89.92%) reported that they would *advise parents to vaccinate their children*.

Table 2. Distribution of Response Categories Across Thematic Domains

Thematic domain	Positive attitude*	Neutral attitude	Negative attitude**
	%		
Attitudes toward the effectiveness and safety of vaccination	69.63	17.88	12.46
Mandatory vaccination and the right to make vaccination decisions	49.58	23.11	27.31
Sources of information and the media	37.47	22.02	40.50
Vaccination education	36.77	25.00	38.24
Attitudes toward healthcare professionals	57.14	30.53	12.32
Personal attitudes toward vaccination	91.17	7.98	0.84

*Agree or strongly agree. **Disagree or strongly disagree.

Table 3 presents nursing students' attitudes toward mandatory childhood vaccination by age group. Mean attitude scores ranged from 3.18 to 3.48. The highest mean score was recorded among participants aged 50–59 years ($M = 3.48$), while the lowest

mean score was recorded among those aged 40–49 years ($M = 3.18$). The Kruskal–Wallis test indicated a statistically significant difference in attitude scores across age groups ($\chi^2 = 19.446$; $df = 3$; $P < 0.001$).

Table 3. Nursing students' attitudes toward mandatory childhood vaccination by age group

Age group (years)	n	Mean attitude score	χ^2	df	P*
20-29	92	3.32	19.446	3	<0.001
30-39	9	3.41			
40-49	16	3.18			
50-59	2	3.48			

*Kruskal–Wallis test

Table 4 presents nursing students' attitudes toward mandatory childhood vaccination by year of study. Mean attitude scores ranged from 3.26 to 3.49. The highest mean score was recorded among first-year undergraduate students (n = 9; M = 3.49), while the

lowest was recorded among first-year graduate students (n = 44; M = 3.26). The Kruskal-Wallis test indicated no statistically significant difference in attitude scores across years of study ($\chi^2 = 3.065$; df = 4; $P = 0.547$).

Table 4. Differences in Attitudes Toward Mandatory Childhood Vaccination by Year of Study

Year of study	n	Mean attitude score	χ^2	df	P^*
First-year undergraduate	9	3.49	3.065	4	0.547
Second-year undergraduate	18	3.45			
Third-year undergraduate	23	3.46			
First-year graduate	44	3.26			
Second-year graduate	25	3.34			

Note: Higher scores indicate more positive attitudes toward vaccination. *Kruskal-Wallis test

Table 5 presents nursing students' attitudes toward mandatory childhood vaccination according to employment in the nursing profession. Participants who were not employed in the nursing profession had higher mean attitude scores than those who were

employed (3.453 vs. 3.278). The Mann-Whitney U test indicated a statistically significant difference in attitude scores between the two groups (U = 1166.0; $P = 0.0014$).

Table 5. Differences in Attitudes by Employment Status in the Nursing Profession

Employed in the nursing profession	Mean attitude score	Me	n	SD	U	P^*
Yes	3.278	3.30	63	0.25	1166.0	0.0014
No	3.453	3.42	56	0.29		

Note: Higher scores indicate more positive attitudes toward vaccination. *Mann-Whitney U test

DISCUSSION

Nurses serve as an important link between the healthcare system and patients. Through their knowledge, attitudes, and communication, they can influence parents' understanding and vaccination decisions, as well as attitudes within the wider community [3, 18]. Their role extends beyond the technical administration of vaccines and includes education, counseling, and advocacy, further emphasizing the need for high-quality vaccination education within nursing curricula [18]. Examining nursing students' attitudes toward mandatory childhood vaccination provides insight into how future healthcare professionals perceive and evaluate this public health measure.

The findings showed that nursing students generally had positive attitudes toward childhood vaccination, particularly regarding its effectiveness and safety. A

high proportion of participants agreed that vaccination provides the best protection against infectious diseases and that its benefits outweigh its potential harms. Most participants also disagreed with statements suggesting that vaccination against eradicated diseases is unnecessary or that vaccines cause autism and autoimmune diseases. Nevertheless, the proportion of neutral responses to items concerning vaccine research and potential adverse outcomes indicates that some uncertainty remains. These findings are consistent with previous studies reporting generally positive attitudes toward vaccination among students in health-related fields [19–21]. Such attitudes may provide an important foundation for future professional practice, given the influence healthcare professionals can have on parents' vaccination decisions [18, 32, 33].

Despite the generally positive attitudes, the responses indicated some uncertainty regarding mandatory vaccination, parental autonomy, and the use of sanctions. Most participants supported manda-

tory vaccination, but responses were divided concerning parents' right to make vaccination decisions independently. A similar distribution was observed for items concerning restrictions on the enrollment of unvaccinated children in educational institutions and financial penalties for parents. These findings illustrate that vaccination extends beyond medical considerations and involves ethical, legal, and social dimensions, as also reported in previous studies [19, 22]. Responses concerning the potential stigmatization of unvaccinated children and their families may also reflect students' awareness of the broader social consequences of vaccination policies.

In the domain of sources of information and the media, participants' responses indicated a critical assessment of online information. Although students recognized social media as a common source of information for parents, most did not consider it a reliable source and acknowledged its role in spreading anti-vaccination attitudes. These findings are consistent with numerous international studies emphasizing the influence of digital platforms on the spread of misinformation and declining confidence in vaccines [23–27]. Of particular concern is the phenomenon of so-called “echo chambers,” in which users encounter only information that confirms their existing views, making it more difficult to obtain objective information and make evidence-based decisions [27].

Vaccination education emerged as one of the key areas of weakness. Although students largely recognized parents' lack of knowledge as an important reason for vaccination refusal, a substantial proportion of participants considered the education provided by healthcare professionals to be insufficient. The findings also indicate uncertainty among students regarding their own knowledge, with many considering the information acquired during their education not fully sufficient for future professional practice. These findings are consistent with studies pointing to shortcomings in the education of health professions students, particularly in the practical application of knowledge and communication with patients [28, 29]. Previous research has also emphasized the value of targeted educational interventions and appropriately designed communication strategies for parents [30, 31].

Attitudes toward healthcare professionals were generally positive, although a considerable proportion of participants selected neutral responses, particularly when assessing healthcare professionals' engagement in promoting childhood vaccination. This finding may indicate insufficient visibility of educational activities undertaken by healthcare professionals or inconsistent quality of communication with parents. Given that healthcare professionals are among the most important sources of vaccination information, their expertise, communication skills, and personal attitudes play an important role in building public confidence [32, 33].

The most positive responses were recorded in the domain of personal attitudes toward vaccination. Almost all participants reported that they would vaccinate their own child according to the vaccination schedule of the Republic of Croatia, and a similarly high proportion would advise parents to vaccinate their children. These findings indicate that the generally positive evaluation of vaccination was also reflected in participants' intended personal and professional behavior. This is particularly important because nurses are expected to provide evidence-based information and support parents in making vaccination decisions [18].

Attitude scores differed significantly according to age and employment status in the nursing profession. Participants who were not employed in the nursing profession had higher attitude scores than those who were employed. This employment-related finding is consistent with a large study among Spanish university students, in which students in paid employment expressed less favorable attitudes toward vaccination [34]. However, that study included students from different academic disciplines and did not specifically examine employment in the nursing profession. In contrast, a study among Turkish nursing students found no significant differences in attitudes toward COVID-19 vaccination according to employment in a healthcare facility or age [35]. These differences may be related to the specific vaccines examined, the instruments used, and the characteristics of the samples. In the present study, employment status may also have been associated with age, level of study, or recent exposure to educational content; therefore, the difference cannot be attributed to professional experience alone. Differences among age groups should also be interpreted

cautiously because the groups were unequal in size, the pattern was not linear, and only two participants were aged 50–59 years.

No statistically significant differences in attitude scores were found according to year of study. Previous studies have reported inconsistent patterns regarding academic progression. Among Spanish nursing students, those in more advanced years had more favorable attitudes, whereas among Portuguese students, more positive attitudes were observed in earlier years of study [19]. Similarly, a Bulgarian study found that students in advanced years expressed greater confidence in vaccine effectiveness and were less likely to endorse the misconception that the measles vaccine causes autism [21]. Research conducted among health professions students in Mostar also highlighted the importance of academic activities in shaping vaccination-related attitudes [20]. Although these findings cannot be directly compared because of differences in student populations and measurement instruments, they suggest that the relationship between academic progression and vaccination attitudes may depend on curricular and sociocultural context.

Study Limitations and Future Research Directions

Despite its valuable findings, this study has several limitations. The relatively small convenience sample limits the generalizability of the findings to the wider population of nursing students in the Republic of Croatia. Participants may also have responded in accordance with socially desirable patterns. In addition, the questionnaire used in the study was not validated, and the absence of open-ended questions limited a deeper understanding of the reasons underlying individual attitudes.

Future research should include larger and more representative samples and combine quantitative and qualitative methods to provide a more comprehensive understanding of students' attitudes and knowledge. Longitudinal studies could provide insight into changes during education and professional development. Including practicing healthcare professionals would also enable comparisons between theoretical knowledge and actual clinical practice.

Implications for Clinical Practice and Education

The findings support the need to strengthen vaccination-related education in nursing programs. This should include not only broader theoretical content but also the development of practical competencies and communication skills and preparation for recognizing and addressing misinformation. Based on previous evidence supporting targeted educational and communication strategies [28–31], nursing programs could also incorporate interdisciplinary learning, the involvement of practicing professionals, and simulation-based exercises to better prepare students for vaccination-related challenges in clinical practice.

CONCLUSIONS

The findings of this study indicate that nursing students largely express positive attitudes toward mandatory childhood vaccination, particularly regarding its effectiveness and safety as fundamental aspects of this public health measure. These findings indicate a high level of acceptance of vaccination as a key tool in the prevention of infectious diseases. However, despite the generally positive attitudes, a certain degree of ambivalence was observed, particularly regarding parental autonomy, sanctions related to non-vaccination, and the broader social implications of vaccination. This division in attitudes suggests that students do not view vaccination exclusively from a medical perspective but also recognize its ethical, legal, and social dimensions. This further confirms the complexity and multidimensional nature of mandatory vaccination.

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Conflicts of interest

The authors declare no conflict of interest.

Author Contributions

Conceptualization, M.E. and J.V.; Methodology, M.E.; Software, M.E. and T.M.; Validation, M.E., J.V. and T.M.; Formal Analysis, M.E. and J.V.; Investigation, M.E.; Resources, M.E. and M.B.; Data Curation, M.E. and T.M.; Writing – Original Draft Preparation, M.E.; Writing – Review & Editing, M.E., T.M., J.V. and M.B.; Visualization, M.E. and T.M.; Supervision, J.V. and M.B.; Project Administration, M.E. and J.V..

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